Cyanide Water Quality Criteria

EPA 1985

And

WERF 2007

Virginia DEQ staff presentation

Freshwater WQC

EPA 1985

Rank & genus	LC_{50}
4. Lepomis	99.28
3. Perca	92.64
2. *Savelinus*	85.8
1. *Salmo*	63.45

FAV =44.73

ACR = 8.568

Acute criterion = 22

Chronic criterion = 5.2

WERF 2007(all data)

Rank & genus	LC_{50}
4. *Perca*	92.64
3. Salmo	90.0
2. Salvelinus	85.80
1. Oncorhynchus	*46.53*

FAV = 46.53

ACR = 9.659

Acute criterion = 23

Chronic criterion = 4.8

Freshwater WQC

EPA 1985

Rank & genus	LC_{50}
4 Lepomis	99.28
3 Perca	92.64
2 *Savelinus*	85.8
1 *Salmo*	63.45

FAV =44.73

ACR = 22

Acute criterion = 8.568

Chronic criterion = 5.2

WERF 2007(salmonids deleted)

Rank & genus	LC_{50}
4 *Pomoxis*	102.0
3 Lepomis	99.28
2 Gasterosteus	*98.80*
1 Perca	92.64

FAV = 94.50

ACR = 9.659

Acute criterion = 47

Chronic criterion = 9.8

Setting trout and non-trout criteria for a toxic pollutant would be a new precedent for Virginia

- This is the reverse of EPA's criteria recommendations that do not separate the trout species, but when needed the final criterion is lowered to protect the trout if they require additional protection.
- EPA generally considers variability of toxicity values within a factor of 2-3 as acceptable within a species, and > a factor of 10 is viewed as questionable and requiring further consideration.
- Individual test's acute values for three salmonid species overlap those of several other fish species.
- The sensitivities of the salmonid species are within a factor of 50%, 93% and 97% of the next most sensitive fish and within a factor of 2.2 of 80 % of the fish in the dataset.
- Recent reviews have concluded that rainbow trout data likely represent the response of sensitive "warmwater" fish, and not just "coldwater" species.

Saltwater; WQC

EPA 1985

Rank & genus	LC_{50}
4 *Mysidopsis*	118.4
3 *Menidia*	59
2 *Acartia*	30
1 *Cancer*	4.893

FAV = 2.030

ACR = 2.0

Acute criterion = 1.0

Chronic criterion = 1.0

WERF 2007

Rank & genus	LC_{50}
4 *Americamysis*	118.4
3 Cancer	84.69
2 Menidia	59
1 Acartia	17

FAV = 11.0

ACR = 9.659

Acute criterion = 5.5

Chronic criterion = 1.1

Crab (genus *Cancer*) Data

WERF data (LC_{50} ug/L)
Atlantic species:

- **Rock crab:**
- **EPA;** **4.2, 5.7 = 4.893 mean (SMAV 1985)**
- **WERF;** **44.2, 70.4, 70.9 = 60.37 mean**
- **SMAV 22.11**

Pacific species:

- **Dungeness crab** **68.5**
- **Oregon crab** **130.7**
- **Slender crab** **143.7**
- **Red crab** **153.1**

- **GMAV = 84.68**

WERF's Saltwater Criteria influenced significantly by additional data for crabs (genus *Cancer*)

- Pacific Coast species LC_{50} values 14 to 31 times higher than EPA's value for Atlantic rock crab
- New rock crab LC_{50} values 9 to 14 times higher than EPA's value for Atlantic rock crab

New Data for Rock Crab not reviewed in detail yet

- Referenced in the WERF report as; “Northwestern Aquatic Sciences reports 677-1, 677-2 and 677-4”
- Presented as a poster at SETAC 2004 meeting
- Published elsewhere and peer reviewed??
- DEQ and EPA would have to have original reports and supporting materials in order to have these tests considered acceptable for criteria development.

EPA Guidelines for calculating the Final Acute Value

IV. E. 2. The **result of a test with embryos and larvae of** barnacles, bivalve molluscs (clams, mussels, oysters, and scallops), sea urchins, lobsters, **crabs**, shrimp, and abalones **should be the 96-hr EC50 based on the percentage of organisms with incompletely developed shells plus the percentage of organisms killed**. **If such an EC50 is not available from a test, the lower of the 96-hr EC50 based on the percentage of organisms with incompletely developed shells and the 96-hr LC50 should be used in place of the desired 96-hr EC50**. If the duration of the test was between 48 and 96 hr, the EC50 or LC50 at the end of the test should be used.

New crab toxicity data appears to be based on mortality, not shell development

- Is that a possible reason for the higher LC_{50} values in the newer data?
- The increased GMAV for *Cancer* requires means the use of a ACR of 2.0 can not be used with the new data set.
- Should the Pacific species be used to calculate a criteria for the Atlantic?

Where do we go from here?

- Further investigations are needed for several issues.
- Additional concerns?